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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,556	01/04/2002	Elena M. Shembel	7053-1	7138

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Gregory A. Nelson, Esq.
Akerman, Senterfitt & Eidson, P.A.
222 Lakeview Avenue, Suite 400
P.O. Box 3188
West Palm Beach, FL 33402-3188

EXAMINER

DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 02/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/038,556	Applicant(s) SHEMBEL ET AL.	
	Examiner Tracy Dove	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 27-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/24/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-26, drawn to a polymer electrolyte, classified in class 429, subclass 316.
- II. Claims 27-36, drawn to a method for preparing a solid polymer electrolyte, classified in class 29, subclass 623.1.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product may be made by a materially different process. The halogen containing polymer may a suspension halogen containing polymer or an emulsion halogen containing polymer.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

During a telephone conversation with Neil Jetter on 2/4/04 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-26. Affirmation of this election must be made by applicant in replying to this Office action. Claims 27-36 are

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withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 3/24/03 has been considered by the examiner.

Claims Analysis

Note the specification states lithium batteries having polymer electrolytes are generally configured as gel-type polymer electrolyte which have liquid intermixed with a selected polymer electrolyte matrix material. The polymer electrolyte functions as a separator, being interposed between the cathode and anode films of the battery (page 5, lines 15-18). Thus, the modified polymer material of the present invention functions as a separator.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-26 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a chlorine containing polymer having an enhanced chlorine level, does

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not reasonably provide enablement for any halogen containing polymer having an enhanced halogen level. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. The specification does not provide any examples of specific polymer materials containing halogens other than chlorine (i.e., fluorine, bromine, etc). Polyvinyl chloride is the only halogen containing polymer material disclosed by the specification.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "said modified polymeric material including a halogen containing polymer having an enhanced halogen level" and further recites "said enhanced halogen level relative to a halogen content of said halogen containing polymer formed from polymerization of its monomer", which is confusing and unclear. Specifically, the claim recitation "said halogen containing polymer" is improper because "a halogen containing polymer" as defined by claim 1 has an enhanced halogen level. Examiner suggest amending the claim to recite language such as "modified halogen containing polymer" and "unmodified halogen containing polymer".

Claims 2 recites "said halogen containing polymer", which is indefinite because it is unclear which halogen containing polymer is being limited. Note claim 1 does not require the halogen that creates the "enhanced halogen level" to be the same halogen as the halogen contained in the halogen containing polymer formed from polymerization of its monomer.

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Claims 13 recites "said halogen containing polymer", which is indefinite because it is unclear which halogen containing polymer is being limited. Note claim 12 does not require the halogen that creates the "enhanced halogen level" to be the same halogen as the halogen contained in the halogen containing polymer formed from polymerization of its monomer.

Claim 18 recites "said anode comprises a lithium-ion material", however, it appears the claim should recite "said anode comprises a lithium-ion intercalation material".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 26 is rejected under 35 U.S.C. 102(b) as being anticipated by Chang et al., US 5,389,463.

Chang teaches a polyvinyl halide having a halogen content of at least about 55 wt% of the polymer. The polyvinyl halide may be polyvinyl chloride. The polyvinyl halide can be a post-halogenated polyvinyl halide such as chlorinated polyvinyl chloride (CPVC). The chlorine weight content of the post-halogenated polyvinyl halide should be at least about 60%, with greater than 65% being preferred (col. 4, lines 40-col. 5, lines 15).

Thus the claim is anticipated.

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Claims 1-6, 8, 10, 12-15, 18-22 and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Chia et al., US 6,617,078 B1.

Chia teaches a lithium ion rechargeable battery having a negative electrode, a positive electrode and a separator/polymer electrolyte there between comprising a chlorinated polymer. The polymer is comprised of a chlorinated polyvinyl chloride (col. 2, lines 10-18). The chlorinated PVC may be used alone or blended with a terpolymer of vinylidene chloride. Chlorinated PVC is a well known commercially available material. Preferably the amount of chlorine is at least 57 percent bound chlorine in the polymer. Chlorinated PVC resins of different molecular weights and chlorine contents are commercially available (col. 3, lines 6-33). The electrolyte comprises a lithium salt dissolved in a mixture of organic solvents. The lithium salt may be LiPF_6 , LiClO_4 , LiAsF_6 , LiPF_6 , and combinations thereof. The solvent may be ethylene carbonate, propylene carbonate, dimethyl carbonate, and combinations thereof (col. 4, lines 51-col. 5, lines 4). See also Example 1. The anode is a lithiated carbon material (col. 3, lines 2-5). The anode may be a carbon-based material and the cathode may be a metal oxide (vanadium pentoxide) or lithium transition metal oxide (lithium manganese oxide) (col. 4, lines 8-20). The cathode comprises the chlorinated polymer.

Thus the claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alamgir et al., US 5,252,413 in view of Chang et al., US 5,389,463 and/or in view of Chia et al., US 6,617,078 B1.

Alamgir teaches a lithium battery using lithium ion conductive solid polymer electrolytes composed of solvates of lithium salts immobilized in a solid organic polymer matrix. In particular, lithium batteries using solid polymer electrolytes derived by immobilizing solvates formed between a lithium salt and an aprotic organic solvent(s) in polyvinyl chloride (PVC) are disclosed (abstract). The solid electrolyte comprises 50-90 wt% of the aprotic organic solvent, 5-30 wt% of PVC and 5-15wt% of the lithium salt (col. 4, lines 7-11). Figure 2 depicts results for a Li/LiMn₂O₄ solid polymer electrolyte cell and Figure 3 depicts results for a carbon/ LiMn₂O₄ solid polymer electrolyte cell. The lithium salt may be LiPF₆, LiClO₄, LiAsF₆ or LiPF₆. The solvent may be ethylene carbonate, propylene carbonate or γ -butyrolactone (col. 3, lines 35-65). The negative electrode may contain a carbon material, lithium or a lithium alloy such as lithium-aluminum or lithium-tin. The positive electrode may contain MnO₂, V₆O₁₃, V₂O₅, lithium manganese oxide, lithium polysulfide, polypyrrole, polythiophene or polyacetylene (col. 4, lines 12-42).

Alamgir does not explicitly state the solid organic polymer matrix (separator) of the solid polymer electrolyte contains chlorinated PVC or a chlorinated PVC having 60-72 wt% chlorine.

However, Chia teaches a lithium ion rechargeable battery having a negative electrode, a positive electrode and a separator/polymer electrolyte there between comprising a chlorinated polymer. The polymer is comprised of a chlorinated polyvinyl chloride (col. 2, lines 10-18). The chlorinated PVC may be used alone or blended with a terpolymer of vinylidene chloride.

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Chlorinated PVC is a well known commercially available material. Preferably the amount of chlorine is at least 57 percent bound chlorine in the polymer. Chlorinated PVC resins of different molecular weights and chlorine contents are commercially available (col. 3, lines 6-33). The electrolyte comprises a lithium salt dissolved in a mixture of organic solvents. The lithium salt may be LiPF_6 , LiClO_4 , LiAsF_6 , LiPF_6 , and combinations thereof. The solvent may be ethylene carbonate, propylene carbonate, dimethyl carbonate, and combinations thereof (col. 4, lines 51-col. 5, lines 4). See also Example 1. The anode is a lithiated carbon material (col. 3, lines 2-5). The anode may be a carbon-based material and the cathode may be a metal oxide (vanadium pentoxide) or lithium transition metal oxide (lithium manganese oxide) (col. 4, lines 8-20). The cathode comprises the chlorinated polymer.

Furthermore, Chang teaches a polyvinyl halide having a halogen content of at least about 55 wt% of the polymer. The polyvinyl halide may be polyvinyl chloride. The polyvinyl halide can be a post-halogenated polyvinyl halide such as chlorinated polyvinyl chloride (CPVC). The chlorine weight content of the post-halogenated polyvinyl halide should be at least about 60%, with greater than 65% being preferred (col. 4, lines 40-col. 5, lines 15).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to substitute the chlorinated PVC of Chia or Chang for the PVC of Alamgir in order to improve the properties of the battery. The use of chlorinated PVC shows enhanced high temperature stability of the battery and mechanical integrity of the separator/polymer (Chia; col. 3, lines 6-33). Chang teaches chlorinated PVC has high tensile strength and ductility (col. 3, lines 9-25). Alamgir, Chia and Chang all teach PVC materials for the separator/polymer matrix of a battery. Chia

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teaches that chlorinated PVC is a well known commercially available material for a battery separator/polymer matrix with different molecular weights and chlorine contents available. Chang teaches post-chlorinated PVC is a known material for use as a battery separator. Thus, one of skill would have found it obvious to substitute chlorinated PVC for the PVC of Alamgir because Chia and Chang teach chlorinated PVC is a well known battery separator/polymer matrix material.

Regarding the chlorine content of the chlorinated PVC, Chang teaches the chlorine weight content of the post-halogenated polyvinyl halide should be at least about 60%, with greater than 65% being preferred. Chia teaches chlorinated PVC with an amount of chlorine of at least 57 percent and chlorinated PVC resins of different molecular weights and chlorine contents are commercially available.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Tracy Dove". The signature is fluid and cursive, with the first name "Tracy" written in a larger, more prominent script than the last name "Dove".

Tracy Dove
Patent Examiner
Technology Center 1700
Art Unit 1745

February 5, 2004